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# ON CHAETOGNATHS AND APPENDICULARIANS COLLECTED IN THE CENTRAL PART OF THE INDIAN OCEAN<sup>1)</sup>

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*With a Chart and 2 Tables*

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Chaetognaths and appendicularians were selected out of 26 plankton samples collected<sup>2)</sup> by the Syunkotu-maru, a training ship of the Simonoseki College of Fisheries, at 19 stations in the central part of the Indian Ocean, south-west to the Maldiv Islands, during the period from Dec. 11, 1954 to Jan. 16, 1955 and offered to me for the identification by courtesy of Mr. S. TSURUTA of the Simonoseki College of Fisheries, to whom I express here my hearty thanks for his kindness. The situation of respective stations and the date of each sampling are indicated at the end of this article.

## I. Chaetognaths

The material comprises the following 13 species. The detail of the occurrence is shown in Table 1.

Species	Number of individuals	Percentage
1. <i>Sagitta hexaptera</i>	58	2
2. <i>Sagitta lyra</i>	15	1
3. <i>Sagitta enflata</i>	579	22
4. <i>Sagitta robusta</i>	30	1
5. <i>Sagitta ferox</i>	19	1
6. <i>Sagitta bedoti</i>	381	14
7. <i>Sagitta serratodentata pacifica</i>	766	29
8. <i>Sagitta regularis</i>	267	10
9. <i>Sagitta bedfordii</i>	39	1
10. <i>Sagitta minima</i>	216	8
11. <i>Pterosagitta draco</i>	133	5

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1) Contributions from the Seto Marine Biological Laboratory, No. 276.

2) KITAHARA's quantitative plankton net was hauled vertically at the speed of 50 cm per second. This is a modified HENSEN's net reduced in a smaller size, 25 cm in diameter of the mouth and 100 cm in length, and stretched with sieve silk, GG 68.

12. <i>Krohnitta subtilis</i>	40	2
13. <i>Krohnitta pacifica</i>	48	2
14. Damaged individuals or juv.	44	2

2635

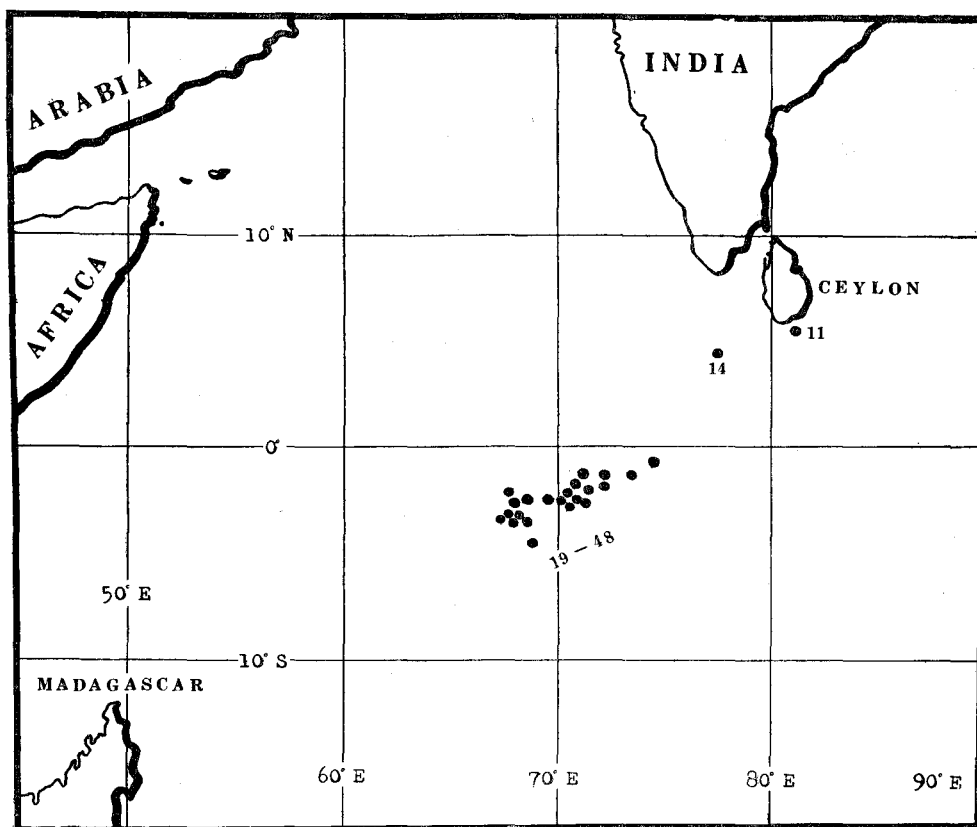


Chart 1. Map showing stations of sampling.

*Sag. serratodentata pacifica* and *Sag. enflata* are the dominant species and followed by *Sag. bedoti* and *Sag. regularis*. *Pterosag. draco* occurs frequently, but rather in a small number. *Sag. minima* occurs less frequently than *Pterosag. draco*, but its population is denser than that of the latter, when it is met with.

The surveyed area is located near, very slightly north of, the Area I of the "Sea lark" Expedition<sup>1)</sup> in 1905. But, the difference found between the chaetognath faunas clarified by that expedition and the present survey seems to be rather remark-

1) BURFIELD, S. T. (1926): The Percy Sladen Trust Expedition to the Indian Ocean in 1905. No. V. The Chaetognatha of the "Sea lark" Expedition. Trans. Linn. Soc. London, Zool. Vol. XIX, Part 1.

able: *Sag. bedoti* occurred much oftener in the present material than in the "Sea lark" material and *Sag. minima* was found in a considerable quantity in the former, although it was quite absent in the latter. Comparing the present results with those of the expedition in May-June 1954 in the waters around the Marshall Islands<sup>1)</sup> in the Pacific, the relative abundance of *Sag. serratodentata pacifica*, *Sag. bedoti*, *Sag. regularis* and *Sag. minima* and the scarcity of *Sag. bipunctata* in the central part of the Indian Ocean seem to be very impressive.

## II. Appendicularians

The following 23 species were found in the material.

Species	Number of Individuals	Percentage
1. <i>Oikopleura longicauda</i>	371	47
2. <i>Oikopleura fusiformis</i>	91	12
3. <i>Oikopleura fusiformis</i> f. <i>cornutogastra</i>	1	—
4. <i>Oikopleura intermedia</i>	7	1
5. <i>Oikopleura gracilis</i>	4	1
6. <i>Oikopleura graciloides</i>	1	—
7. <i>Oikopleura dioica</i>	6	1
8. <i>Oikopleura rufescens</i>	66	8
9. <i>Oikopleura parva</i>	11	1
10. <i>Oikopleura cophocerca</i>	34	4
11. <i>Oikopleura albicans</i>	16	2
12. <i>Oikopleura</i> spp. (damaged)	65	8
13. <i>Megalocercus huxleyi</i>	3	—
14. <i>Stegosoma magnum</i>	42	5
15. <i>Pelagopleura verticalis</i>	5	1
16. <i>Fritillaria haplostoma</i>	2	—
17. <i>Fritillaria formica</i> f. <i>digitata</i>	11	1
18. <i>Fritillaria fraudax</i>	1	—
19. <i>Fritillaria gracilis</i>	2	—
20. <i>Fritillaria pellucida</i>	6	1
21. <i>Fritillaria borealis</i> f. <i>sargassi</i> (large individual)	4	1
21a. " " (small individual)	28	4
22. <i>Fritillaria borealis</i> f. <i>intermedia</i>	1	—

1) TOKIOKA, T. (1955): On some plankton animals collected by the Syunkotu-maru in May-June 1954. I Chaetognatha. Publ. Seto Mar. Biol. Lab., IV (2-3).

23. <i>Fritillaria megachile</i>	2	—
24. <i>Fritillaria</i> spp. (damaged)	4	1
25. <i>Appendicularia sicula</i>	4	1
		<hr/>
		788

*Oik. longicauda* is the dominant-most species of all and followed by *Oik. fusiformis*. *Oik. rufescens* occurs also frequently, while *Oik. cophocerca* and *Steg. magnum* are found less frequently and only in a small amount. The remarkable increase of the percentage of *Oik. fusiformis* and the decrease of that of *Oik. fusiformis* f. *cornutogastra* in the Indian Ocean are noticeable, when the present results are compared with those of the survey in the Arafura Sea. Both *Oik. dioica* and *App. sicula* are decreased considerably in the central part of the Indian Ocean. The detail of the occurrence of respective species may be understood in Table 2.

Station Number	Situation		Date
	Latitude	Longitude	
11	5°37' N	81°07' E	1954 Dec. 11
19	0°43' S	74°36.5' E	15
22	1°07.8' S	71°15' E	18
23	1°46' S	71°01' E	19
24	2°41' S	70°35' E	20
25	2°15' S	70°31' E	21
33	2°11.5' S	67°55.2' E	1955 Jan. 6
34	2°26' S	68°33' E	7
35	3°02' S	68°10' E	8
36	2°28' S	68°01' E	9
37	3°19' S	68°19' E	10
38	4°35' S	68°58' E	11
39	3°17' S	68°00' E	12
40	3°10' S	67°59' E	13
41	3°17' S	67°43' E	14
43	—	—	15
44	—	—	15
45	2°31' S	70°18.5' E	15
47	2°02' S	71°33' E	16

Table 1. Detail of the occurrence of chaetognaths.  
F. O. .... Frequency of occurrence, M.N./H. .... Mean number of individuals per haul.

Station Number	11		19	22		23	24		25	33		34		35	36	37		38	39	40		41	43	44	45	47	F. O.	M. N. H.
Haul Distance	0-100 m	?	0-100	0-100	0-500	0-100	0-100	?	0-100	0-100	0-100	0-100	0-100	0-200	0-100	0-100	0-200	0-100	0-100	Sur.	0-100	0-200	0-100	0-100	0-100	0-200		
<i>Sag. hexaptera</i>					6	2			1	4		2	2				4	3	1	6	2	3	5	1	9	7	16/26	3.6
<i>Sag. lyra</i>							1					4					3	1			1		3	2			7	2.1
<i>Sag. enflata</i>	1	1	4	15	35	25	21	5	45	43	46	51	3	24	10	8	17	22	33	7	23	32	12	64	18	14	26	22.3
<i>Sag. robusta</i>				2	4	1	2			5		2		1	6	1		1		2			1	1		1	14	2.1
<i>Sag. ferox</i>	1		1		2						1		1	2					4	1	1		3	2			11	1.7
<i>Sag. bedoti</i>		1	4	6	15	27	10		18	43	14	26	9	9			4	6	8		9	4	31	74	45	18	21	18.1
<i>Sag. serratodentata pacifica</i>	10	3	12	13	91	41	10	5	27	36	73	90	9	54	8	7	43	13	17	5	18	32	32	45	40	32	26	29.5
<i>Sag. regularis</i>	5	3	1		5	6	7	1	10	16	2	6	2	2	66	1	5	13	10	12	12	13	19	22	25	3	25	10.7
<i>Sag. bedfordii</i>				2			1		5		2				1			14			1	5		1	5	2	11	3.5
<i>Sag. minima</i>							1			49	24	27	6	18		5	9	8	15		14	2	25	12	1		15	14.4
<i>Sag. spp.</i>				2	4	1	4			5	1	2	2	1		14		1	2			1		3		1	15	2.9
<i>Pserosag. draco</i>	5		2	6	23	3	4		5	10	4	10		5			5	9	2		1	2	12	9	6	10	20	6.7
<i>Ktta. subtilis</i>					3	1	1		1	2		3	1	3		1	7	3	1		3	3		5		2	16	2.5
<i>Ktta. pacifica</i>				2		1	3	1	4	9	5	8				1	1	1		1	1	2		7	1		16	3.0
Total	22	8	24	48	188	108	65	12	116	222	172	231	35	119	91	38	98	95	93	34	86	99	143	248	150	90		

Table 2. Detail of the occurrence of appendicularians.  
F. O. .... Frequency of occurrence, M.N./H. .... Mean number of individuals per haul.

Station Number	11	19	22	23	24	25	33	34	35	36	37	38	39	40	41	43	44	45	47	F.O.	M.N. H.							
Haul Distance	0-100 m	?	0-100	0-100	0-500	0-100	0-100	?	0-100	0-100	0-100	0-100	0-100	0-200	0-100	0-200	0-100	0-100	0-200	Sur.	0-100	0-200	0-100	0-100	0-100	0-200		
<i>Oik. longicauda</i>	1	1	36	8	7	12	3	15	3	3	63	8	2	17	3	2	19	9	15	43	11	32	10	18	20	10	26/26	14.3
<i>Oik. fusiformis</i>			5	3		7	2	10	2	2	5	3		3	1	1	4	3	3		7	11	1	8	9	1	21	4.3
<i>Oik. fusiformis</i> <i>f. cornutogastra</i>																					1						1	1
<i>Oik. intermedia</i>																2	5										2	3.5
<i>Oik. gracilis</i>												2					2										2	2
<i>Oik. graciloides</i>																								1			1	1
<i>Oik. dioica</i>																1	1	3		1							4	1.5
<i>Oik. rufescens</i>			5		3	3	2	13	1	3	14		1	2		2	3	1	1	3		3	1	1	4		19	3.5
<i>Oik. parva</i>								1						1							3	1			2	3	6	1.8
<i>Oik. cophocerca</i>		1	1				2	1		3	4			3		1	3		1		4	3		1	4	2	15	2.3
<i>Oik. albicans</i>					2									4		1	5					2			1	1	7	2.3
<i>Oik. spp.</i>	1		1	8	6		2	4	2	4	2	1		5		5	1		5	2		4		5	4	3	19	3.4
<i>Megal. huxleyi</i>								1	1							1											3	1
<i>Steg. magnum</i>				1	5	1	5	5	5			1		2		6	1		2	2	1	1		2		2	16	2.6
<i>Pelag. verticalis</i>														1		2	1					1					4	1.3
<i>Frit. haplostoma</i>		1																						1			2	1
<i>Frit. formica</i> <i>f. digitata</i>								1				2		2			1				1	2			2		7	1.6
<i>Frit. fraudax</i>					1																						1	1
<i>Frit. gracilis</i>																										2	1	2
<i>Frit. pellucida</i>										1	1				1		2					1					5	1.2
<i>Frit. borealis</i> f. <i>sargassi</i> large ind.									1												1					2	3	1.3
<i>Frit. borealis</i> f. <i>sargassi</i> small ind.		1		4	14	2	1													1		1		1		3	9	3.1
<i>Frit. borealis</i> <i>f. intermedia</i>																								1			1	1
<i>Fruit. megachile</i>					1									1													2	1
<i>Frit. spp.</i>					2										1	1											3	1.3
<i>App. sicula</i>																1			1		1	1					4	1
Total	2	4	48	24	41	25	17	51	15	16	89	17	3	41	6	25	49	16	28	52	29	64	12	39	46	29		